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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,515	10/16/2003	Im-soo Park	249 / 255 DIV	8169
7590 05/17/2006			EXAMINER	
LEE & STERBA, P.C. SUITE 2000 1101 WILSON BOULEVARD ARLINGTON, VA 22209			CHAUDHRY, SAEED T	
			ART UNIT	PAPER NUMBER
			1746	

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/685,515	Applicant(s) PARK ET AL.	
	Examiner Saeed T. Chaudhry	Art Unit 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6,8-10,12,14,15,17,18 and 20-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 6,8-10,12,14,15,17,18 and 20-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) ☐ Notice of References Cited (PTO-892) | 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) ☐ Notice of Informal Patent Application (PTO-152) |
| 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) ☐ Other: ____. |

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 14, 2006 has been entered.

Claims 1-5, 7, 11, 13, 16 and 19 have been canceled and claims 6, 8-10, 12, 14-15, 17-18, and 20-24 are pending in this application for consideration. The drawings filed October 16, 2003 has been placed approved by the examiner.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 6, 8-10, 12, 14-15, 17-18, and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al in view of Franca et al.

Nishizawa et al (4,871,417) disclose a method and apparatus for executing

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surface treating for thin substrates such as semiconductor wafers, wherein the substrates are treated with etching, rinsing, etc. on surfaces thereof while being spun. The apparatus is employed for surface treating of a semiconductor wafer 1 formed with deep and minute trenches 1a on a surface thereof as shown in FIG. 2A, by the use of etchant, rinsing liquid, etc.

Substantially on the center of a chamber 2 in the shape of a box, there is disposed a table-shaped spinner 3 for holding the wafer 1 horizontally. To a central bottom of the spinner 3 is connected a spinning shaft 4, which is shingly supported by a bearing 5 at the bottom of the chamber 2 and is, extending through the bottom, connected to a motor 6 outside of the chamber. Upward of the spinner 3 in the chamber 2 there are provided nozzles 7, 8, and 9 for spouting etchant, nitrogen gas, and a rinsing liquid against the trenched surface of the wafer respectively.

On the ceiling of the chamber 2 is formed an opening 2a which is airtight covered with a light-permeable lid 10 made of quartz (an antipollution plate). Upward of the lid 10 there are provided heating and drying light source 11 such as a halogen lamp or the like and ultraviolet radiation light source 12 respectively. Moreover, there are provided dome-shaped reflectors 13 upward of the light sources 11 and 12 in a manner to cover them, so as to attain the effective light-emission and projection from the sources to the inside of the chamber 2 through the lid 10 (see col. 3, lines 10-40 and Fig. 1).

Furthermore, supplying the liquid may continue during the execution of the pressure reduction(step S5). Yet further, the ultraviolet irradiation may be continually performed during the executions of steps S3-S6 (see col. 6, lines 27-30). In step S2, ultraviolet light is emitted to the surface of the semiconductor wafer 1 from the light source 12 after the doors 25 and 26 are

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closed, so as to dissolve impurities, such as valence-bonded fluoride, remaining in the interior surfaces of the trenches. Thus activation of the interior surfaces of the trenches 1a can thus be effected. Thereafter, in step S3 the motor 6 is driven to rotate the spinner 3 at a predetermined speed, e.g. a few hundred revolutions per minute. In step S4, the etchant as a surface treating liquid 36 is spouted from the nozzle 7 against the trenched surface of the wafer 1 being spinned (see col. 4, lines 49-59).

It is moreover preferable that the ultraviolet light also be emitted to the surface of the wafer while the pure-water rinsing being executed, since the interior surfaces of the trenches 1a can be activated and hence impurities thereon will become susceptible of removal (see col. 6, lines 57-62).

Nishizawa et al disclose light source 11 for heating and nozzle 9 for dispensing rinsing liquid. Therefore, the reference is capable of dispensing and heating together. Further, light source 12, which is UV light inherently heat the liquid and surface of wafer during dispensing the rinsing liquid and the reference discloses that it is moreover preferable that the ultraviolet light also be emitted to the surface of the wafer while the pure-water rinsing being executed. The rinsing solution is a cleaning solution because it remove the contamination and the prior processed liquid from the surface. However, the reference fails to disclose a focusing lens and a laser.

In an analogous art, Franca et al (6,178,973) disclose a method and apparatus for treating semiconductor surface in a chamber. The apparatus comprising a laser beam producing laser source 14, a quartz plate for antipollution 52 and optical condensing means are disposed along the laser beam. In preferred embodiment, the configuration of the optical system may be chosen

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to achieve the most uniform beam and energy density at the work surface (see abstract, Fig. 2, and col. 4, lines 17-55).

FIG. 1A shows an alternative embodiment of the optical system depicted in FIG. 1. FIG. 1A includes a quartz window 7 between the optical condensing means and the work surface 6. The quartz window allows for transmission of the light energy beam. An anti-reflective coating common to the optics industry may be added to the quartz plate to minimize the attenuation during transmission of the beam. This configuration may be used in the embodiment wherein the same optical source is used to perform both the ozone generation in the generation chamber and the substrate surface treatment in the treatment chamber. If the quartz plate is not perpendicular to the incident light beam, an optical compensator, such as a slightly angled lens or another quartz plate, may be used to correct for any aberration of the transmission light beam (see col. 4, lines 23-37).

It would have been obvious at the time applicant invented the claimed process to incorporate a focusing lens (5) as disclosed by Franca et al into the apparatus and process of Nishizawa et al for most uniform beam and energy density at the work surface and to enhance the cleaning effect of laser light on the surface of substrate. Further, it is well known in the art to use laser as disclosed by Franca et al instead of a halogen lamp in the apparatus and process of Nishizawa et al for cleaning semiconductor surface because both the references are cleaning the semiconductor surface and one would interchange the source of light such as UV or laser. Furthermore, using sapphire instead of quartz is matter of choice and design since it is well known in the art to interchange these materials. Also, controlling rotational speed, power of light

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and amount of cleaning solution would have been obvious to manipulate for better and efficient results.

Response to Applicant's Arguments

Applicant argued that while the Franca et al reference may disclose a quartz window 52, this quartz window is on an ozone generation chamber 12 in which the optical condensing means is located. The quartz window is used for aberration introduced by the optical condensing means. While, as shown in FIG. 1A of the Franca et al reference, a quartz window 7 may be between the optical condensing means and a work surface clearly cannot protect the optical condensing means from the ozone.

These arguments are not persuasive because Franco et al disclose "Numerous optical configurations may be used to achieve the desired goal of both generating ozone and providing a light beam component at the work surface 6. The embodiment depicted in FIG. 1 is just one example. In a preferred embodiment, the configuration of the optical system may be chosen to achieve the most uniform beam and energy density at the work surface." Therefore, one of ordinary skill in the art would use a condensing means as disclosed by Franca et al into the apparatus and process of Nishizawa et al to enhance the cleaning effect.

Applicant argued that Franca et al reference is directed to an apparatus for ozone generation, and does not provide any solution, i.e., a chemical substance dissolved in a liquid, from which the quartz window can protect the optical condensing means.

This argument is unpersuasive because these features are disclosed by Nishizawa et al and Franca et al has not to disclose these features.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Saeed T. Chaudhry whose telephone number is (571) 272-1298. The examiner can normally be reached on Monday-Friday from 9:30 A.M. to 4:00 P.M.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Michael Barr, can be reached on (571)-272-1414. The fax phone number for non-final is (703)-872-9306.

When filing a FAX in Gp 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communication with the PTO that are for entry into the file of the application. This will expedite processing of your papers.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (571) 272-1700.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Saeed T. Chaudhry

Patent Examiner

MICHAEL BARR
SUPERVISORY PATENT EXAMINER

A handwritten signature in black ink, appearing to read "Michael Barr", is written over the printed name and title.